CUTTING DOWN UNCLE SAM'S LAND WASH BILL:

A radio discussion from information assembled by the Bureaus of Agricultural Engineering, Chemistry and Soils, and the Forest Service, United States Department of Agriculture, and presented during the Western Farm and Home Hour Thursday, September 22, 1932, through Station KGO and nine other stations associated with the NBC-KGO network, Pacific Division, National Broadcasting Company.

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ANNOUNCER (Nicholas): Today, Farm and Home Hour listeners, we are to sit in on a discussion of recent results of research into our national problem of soil erosion. We have with us three of the Department of Agriculture men who represent the Federal Bureaus that have been studying this problem. They are all old friends of ours, but I will introduce them again to you.

First in line is M. H. Lapham, senior soil scientist of the Bureau of Chemistry and Soils. Mr. Lapham supervises the soil survey work in several of the western states. Friends, Mr. Lapham.

LAPHAM: How are you today, folks?

NICHOLS: And here's A. Lincoln Fellows, senior irrigation specialist of the Bureau of Agricultural Engineering. Mr. Fellows has talked to us many times in the past on irrigation and drainage subjects. I welcome you again to our conference table, Mr. Fellows.

FELLOWS: Thank you, Mr. Nichols. I'm glad of this opportunity to visit again with you people of the Farm and Home Hour audience.

NICHOLS: The Forest Service deals with the problem of erosion control on millions of acres of land in forests and ranges. Their spokesman today will be none other than R. W. Ayres, whom most of you already know -- Mr. Ayres.

AYRES: Hello, everyone, and I'm also glad to be here.

NICHOLS: Now we're all on speaking terms once more, and having been formally introduced, the discussion can start. Mr. Lapham, I understand that your Bureau -- the Bureau of Chemistry and Soils -- were pioneers in the study of soil erosion. When did your Bureau first begin to realize the size of Uncle Sam's land wash bill?

LAPHAM: To answer your question, Mr. Nichols, we will have to go back about twenty-five years. The late Dr. Whitney of the Bureau of Soils desired to know why the soil of a certain county in the Piedmont section was so poor. So he assigned two young men to the investigation. One of these two young men was Hugh Bennett, who is now in charge of our work on erosion research, and this is his report:

"We discovered the first clue in our investigation when we compared the soil in a woodlot with soil in fields alongside the woods. The woods soil was rich, mellow loam. The soil in the adjoining fields was a stiff, droughty clay. Why? Well, we soon found that through years of cultivation, the rich, mellow top soil had washed off, leaving the clay subsoil exposed. Erosion

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had taken away the once fertile plow land of that county".

Our soil surveyors in mapping and classifying soils all over this country have found conditions similar to those that Mr. Bennett describes in many areas. Mr. Fellows and associates in the Bureau of Agricultural Engineering have seen the same thing. Mr. Ayres and other men of the Forest Service, too, have observed tremendous destruction by soil washing of forest lands improperly handled and of grazing lands unmercifully over-grazed.

NICHOLS: I take it from what you say that the problem of soil erosion is present everywhere?

LAPHAM: It is. We know now that soil erosion is going on at a far greater rate than we thought even a few years ago. We know now that erosion affects fully three-quarters of all cultivated land. We estimate that erosion has essentially ruined at least 21 million acres of land once in cultivation. Part of the fertile top soil on vast acreages washes away every time enough rain falls to make water run down hill. No other nation of the western hemisphere is wasting its farm lands as rapidly as the United States. Soil erosion is truly a national as well as an individual problem.

FELLOWS: Yes, and the bad part of it is that sometimes the individual landowner does not realize that erosion is destroying his land. L. A. Jones, chief of the division of drainage and soil erosion control in the Bureau of Agricultural Engineering, cites an actual case to illustrate this point. A certain Nebraska farmer wrote to his College of Agriculture asking why the soil in many places on his farm was turning from black to brown. He said that the brown spots did not yield as good crops as they had before the color changed. The soil specialists at the State College told this man that his soil was not changing color but eroding away. The brown spots were areas of subsoil from which the fertile, black top soil had washed off. It was hard to believe, because this man's land was not steep, only slightly rolling, and there were no signs of gullies on the place. But it was true.

LAPHAM: Sadly true. The same sort of costly damage is adding to the trouble of thousands of farmers. Our bureau has mapped many large areas in 35 of the 48 States where erosion is a serious menace to farms.

AYRES: I might add that Forest Service surveys made during the past year show that erosion of Western water sheds threatens huge farm and city property values. For instance, Perkins Coville, one of our erosion research men, reports that the survey of the Rio Grande water shed in New Mexico shows that erosion is more or less serious on 75 per cent of the area. Already the silt brought down in floods has filled up a seventh of the capacity of the Elephant Butte reservoir. Soil erosion on this one watershed menaces an agricultural investment of 47 million dollars in the Elephant Butte irrigation project, an assessed valuation of 40 million dollars for lands and improvements in the middle Rio Grande Valley, 700 miles of railroad, thousands of miles of highway, and 15 million acres of range land. Or take the situation in the upper basin of the Colorado River in Utah, Colorado, and Wyoming. The values at stake there are even greater than on the watershed of the Rio Grande. Our survey shows erosion menacing three-quarters of that area.

NICHOLS: A problem of this magnitude certainly requires the close attention of Department of Agriculture soil scientists. What is your Bureau doing to help solve this erosion problem, Mr. Lapham?

LAPHAM: Well, we maintain a number of soil erosion stations. These stations are located at points where the soils men and engineers can study the erosion troubles of 12 major soil regions; specifically they are located near Guthrie, Oklahoma; Temple, Tyler and Spur, Texas; Hays, Kansas; Bethany and Columbia, Missouri; Statesville, North Carolina; Pullman, Washington; Clarinda, Iowa; La Crosse, Wisconsin; and Zanesville, Ohio.

NICHOLS: How is the work carried on at these stations?

LAPHAM: First, we measure the losses of water and soil from different slopes used for different crops, as well as for bare ground. Secondly, we are trying out every promising practical method of slowing down these losses. The engineers are developing the most effective types of terraces, soil saving dams and farm machinery for use over terraced land. The soils men are trying out different methods of cropping. Briefly, they are determining what place cover crops, grass, and other soil saving plants have in the regional agriculture as a means of saving soil and water.

NICHOLS: Well, now, after two years of research would you say that erosion is more or less serious than you had previously thought, Mr. Lapham, and Mr. Fellows?

FELLOWS: More serious, I'd say.

LAPHAM: Yes, Decidedly.

NICHOLS: Can you give us an example?

LAPHAM: Well, for instance, the results at Bethany, Missouri. There, land sloping 8 feet in 100 feet and kept under continuous corn cultivation has lost soil at the annual rate of from 100 to 140 tons per acre. That means about an inch of soil a year. Fertile top soil. The average soil depth there is only about 7 inches. So this means that in seven years, under these conditions, man will dispose of his principal capital, the productive top soil.

FELLOWS: For another instance, you might take results at the Temple, Texas, station. There one 5-inch rain in 1930 removed 23 tons of soil per acre from 4 per cent slopes planted in cotton. Still another instance was the loss last year of nearly 44 tons of soil per acre from an unterraced area at the Guthrie, Oklahoma; Experiment Station. On a similar terraced area at Guthrie only one and a quarter tons of soil were lost per acre; 1/35th of the loss from unterraced land.

NICHOLS: Then terraces are effective in holding down erosion?

LAPHAM: Yes, they are very effective. And with proper rotations and cover crops terraces will be doubly effective. Mr. Fellows, tell them about the results you agricultural engineers got by terracing at Bethany, Missouri.

FELLOWS: You have already mentioned our results but they are worth repeating. We found in our work at Bethany that unterraced land of 8 per cent

slope planted to corn lost over 100 tons of soil per acre each year. But the loss from terraced areas of the same slope planted to the same crop was only 1/36th as much, less than 3 tons per acre.

NICHOLS: Are there any differences in terraces?

FELLOWS: Yes, there are considerable differences. For instance, our engineers have discovered, that terraces built with channels of slight grade, such as two to four inches per 100 feet, suffer less from erosion in the channel than terraces built with channels of steeper grade, such as 6 inches per 100 feet.

Another important finding at Guthrie is that it costs over six times as much to terrace gullied land as to terrace the virgin land before the gullies are formed.

NICHOLS: I can't think of anything else to ask you about your terracing work. But if I remember correctly, you, Mr. Lapham, alluded a little while ago to your Bureau's work with cropping methods as a means of erosion control. Tell us about some of the results.

LAPHAM: I'll be glad to, Mr. Nichols. One method that has been successful at the Texas station, and that is giving promising results in Oklahoma, North Carolina and Missouri, is strip cropping. We sow strips of thick growing soil-saving crops such as oats, sorghum, lespedeza and sweet clover along the contours of slopes. Then we plant border strips of clean tilled crops such as cotton and corn between the strips of thick growing crops. The thick growing crops slow down the rate at which the water runs off and that, of course, slows down the erosion.

An inexpensive method of controlling small gullies that has worked out at the Bethany station is spreading rapidly in different parts of the country. The method is to fill old fertilizer sacks with soil and grass roots and place these sacks in the bottom of the washes. The roots grow through the sacks, take hold in the ground and quickly establish effective grass dams.

At the Hays, Kansas, Experiment Station, a machine has been developed that digs 10,000 holes per acre on fallow land. The holes hold back about 50 thousand gallons of rain water per acre. Thus they increase absorption of water and reduce erosion. We also are having success at Hays with cultivating row crops along the contours and leaving every third or fourth row open without a crop to act as a water furrow.

Just plain crop rotation slows down erosion enormously, we have found out at all the erosion stations. To give one example of the water-and-soil-saving capacity of vegetation: At the Hays, Kansas, station, native sod has lost eight thousand times less soil and retained 200 times more rainwater than the same land planted to kafir corn, which is a clean-tilled crop.

Ayres, I think you should explain here some of the work of the Forest Service cooperating with the Wisconsin Experiment station in the badly eroded areas in Southwestern Wisconsin.

AYRES: I suppose the shortest statement of the problem in these sections is to say that in order to control heavy erosion damage to farm land, we have to adopt a system of management of the land which places cultivated fields in the more or less level bottoms and on the gentler upland slopes; pastures or hay lands on the slopes just steeper than the ones that can be plowed without bad erosion; and tree growth on the still steeper slopes that can't be used for pasture or hay land.

We know that a fully stocked forest makes the most effective vegetative cover to stop erosion of land. But let me remind you that forests hold soil and water not alone because of the trees, but because of the layer of dead and living vegetation on the ground beneath the trees. Some of the Forest Service men ran an experiment to find out the true value of the forest litter in keeping soil open to hold water and check erosion.

NICHOLS: Does the litter itself soak up and hold the rainfall?

AYRES: Yes, the litter will take up considerable quantities of water. But that's not its main value. The mantle of litter prevents erosion, so only clear water reaches the surface of the soil. Therefore the surface soil stays porous and very absorbent and is able to take up much larger quantities of this water than bare soil. The experiment I referred to illustrates this protective function of forest litter. The plots from which the forest litter had been burned off lost 2300 times as much soil by erosion as the plots with forest litter undisturbed. Another group of experiments in California showed that the removal of the vegetative cover by fire invariably makes the runoff of water 15 or 20 times greater than the runoff from unburned areas.

If woods and range lands are to be effective in conserving soil and water we must prevent extensive overgrazing and keep out fires. We can do this by sensible grazing and sensible timber production. Thus we can save the soil and if later on our descendants want to clear the forest land for cultivation or pasture they will have good land to use.

FELLOWS: Mr. Ayres, I wish you'd call attention to the use of tree planting, in stabilizing gullies that have already formed and keeping them from extending.

AYRES: Well, people are successfully using trees and other plants for this purpose in many sections. In the eastern United States black locust is one of the species most commonly used for planting in gullies. These tree plantations improve the soil. And they yield profitable timber crops. But I think we're all agreed that the thing to do is not to confine ourselves to reclaiming gullies, but to keep them from forming.

LAPHAM: And besides keeping gullies from forming, the problem of the landowner and of the nation is to stop the even more extensive sheet erosion, that is, the slow removal of the topsoil over entire fields -- that agency which takes away part of the soil every time it rains. We have been able to give you in this discussion today only glimpses of the results showing up in the experimental work at the soil erosion stations. Speaking on behalf of the Department of Agriculture we want to invite all of you who live in the vicinity of the soil erosion stations and any of you who happen to be near them on your trips to stop in and see the experimental plots and talk over the results with the men at

the stations. We shall be glad to give you the information we have on how to apply strip cropping, grass dams, strip subsoiling, and the other methods to your own problems of erosion control.

FELLOWS: And the engineers will give you our most recent information on the best methods of constructing terraces and soil saving dams for different sections of the country and the use of farm machinery on terraced lands.

NICHOLS: We are all grateful to the three of you -- Mr. Lapham, Mr. Fellows and Mr. Ayres for this discussion. We were pleased to learn of the research progress that has been made by soil scientists, engineers and foresters. Thank you very much, and keep us in mind when further results from your work become available.